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Should I Roof my Lumber?

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THOMAS M. HEADLEE joined the staff of the Central States Station in June of 1957 after graduating from the University of West Virginia with a Bachelor's Degree in Forestry. He was assigned to the Kaskaskia Experimental Forest in southern Illinois where he worked as a Forest Products Technologist in primary utilization research. He co-authored two previous publications on the use of pile roofs in the air-drying of lumber.

Tom left the Forest Service in April of 1959 to join his father in the lumber business. He is currently supervising the logging and milling operations of one of the Russell E. Headlee Lumber Company's three sawmills. He and his wife and two children reside at Holbrook, Pennsylvania.

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Should I Roof my Lumber?

by

Thomas M. Headlee

Many sawmill and yard operators air-dry lumber in piles without roofs because they are not aware of the advantages of using roofs. At the Kaskaskia Experimental Forest in southern Illinois lumber pile roofs were found to be a good investment, especially on high-grade lumber. Recent tests with yellow-poplar lumber confirm results of earlier studies using oak.[1/]

Degrade and rate of air-drying were measured in roofed and non-roofed piles of 4/4-inch yellow-poplar lumber. Six piles were studied during the spring, and six during the summer. All lumber was dried for 45 days. In both seasons there were two piles each of three grades of lumber: Selects and Better, No. 1 Common, and No. 2A and 2B Common. One pile of each grade of lumber was roofed, the other was not roofed (fig. 1). The lumber was piled edge-to-edge in piles 6 feet wide, 12 feet long, and 10 tiers high. Low piles were used because experience has shown that, regardless of pile height, the major beneficial effects of a pile roof usually appear in the top few tiers. Four moisture-sample boards were included in each pile to measure the rate of moisture loss.[2/]

1/ Clark, Wendell P. and Headlee, Thomas M. Roof your lumber and increase your profits. Forest Prod. Jour. 8(12): 19A-21A, illus. 1958.

2/ All sample boards were prepared as recommended in "Methods of Determining the Moisture Content of Wood," U.S. Forest Products Laboratory Report 1649 (1950).

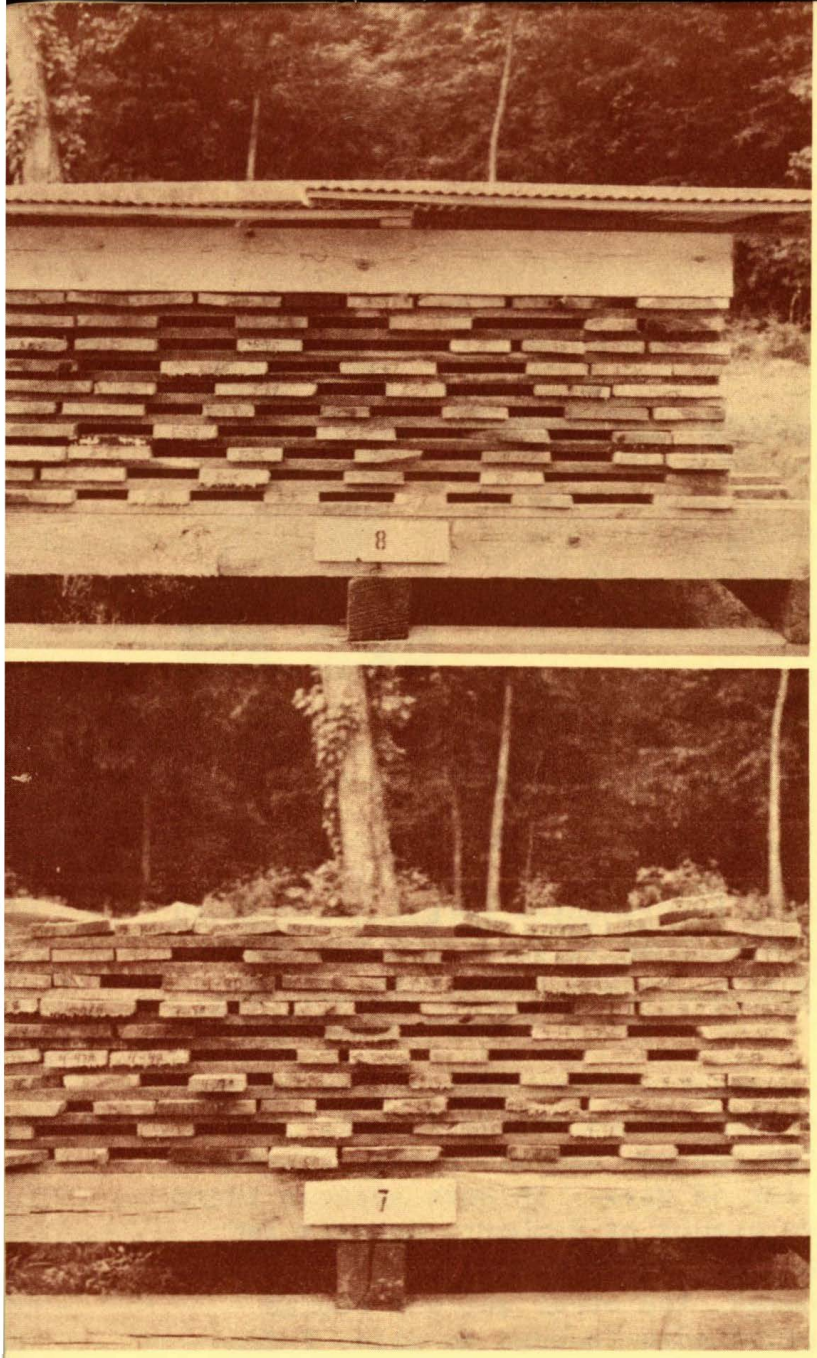

Figure 1.--A roofed (top) and a non-roofed (bottom) pile of 4/4-inch yellow-poplar lumber used in the study. Roofs were of corrugated steel on a wood frame.

Warpage caused serious losses in the upper tiers of non-roofed piles during both seasons. Based on January 1959 Memphis Market Prices, adjusted to apply to southern Illinois mills[3/], the top tier (about 72 board feet) of non-roofed, No.1 Common yellow-poplar lost $5.18 in value due to warp alone (table 1). Such losses were practically non-existent in roofed piles.

3/ Lumber values per thousand board feet are as follows: FAS - $133, FAS 1F - $125, Saps - $125, No. 1 Common - $97, No. 2A Common - $66, No. 2B Common - $47, and No. 3A and 3B Common - $30.

Table 1.--Comparative value losses due to drop in grade in roofed and non-roofed piles of yellow-poplar lumber by original grade in piles

(In dollars)

SELECTS AND BETTER

Tier	Spring drying season			Summer drying season		
	Value loss in non-roofed piles	Value loss in roofed piles	Advantage of roof	Value loss in non-roofed piles	Value loss in roofed piles	Advantage of roof
1 (top)	3.26	.98	2.28	3.59	.70	2.89
2	.74	.22	.52	3.17	1.82	1.35
3	.22	.22	.00	4.25	1.64	2.61
4	.50	.00	.50	3.19	2.18	1.01
5	.00	.22	-.22	1.42	1.01	.41
6	.00	.18	-.18	4.44	2.09	2.35
7	.20	.40	-.20	2.83	.00	2.83
8	.20	.37	-.17	4.25	.00	4.25
9	.00	.00	.00	2.12	.00	2.12
10	.37	.37	.00	2.51	.00	2.51
Total	--	--	2.53	--	--	22.33

NO. 1 COMMON

1 (top)	5.18	1.03	4.15	4.26	1.59	2.67
2	1.17	.25	.92	1.96	1.40	.56
3	.20	.20	.00	.84	1.22	-.38
4	.61	.25	.36	1.70	1.49	.21
5	1.30	.97	.33	2.28	1.28	1.00
6	1.49	.56	.93	1.24	1.86	-.62
7	1.66	2.13	-.47	2.23	1.91	.32
8	1.07	.20	.87	1.74	2.01	-.27
9	.53	.00	.53	1.12	1.98	-.86
10	.37	.28	.09	1.24	1.49	-.25
Total	--	--	7.71	--	--	2.38

NO. 2A AND 2B COMMON

1 (top)	.27	.41	-.14	1.39	.00	1.39
2	.11	.26	-.15	.00	.11	-.11
3	.26	.15	.11	.00	.14	-.14
4	1.03	.15	.88	.29	.24	.05
5	.17	.00	.17	.00	.00	.00
6	.00	.00	.00	.24	.00	.24
7	.17	.00	.17	.00	.00	.00
8	.22	.00	.22	.20	.00	.20
9	.24	.00	.24	.00	.00	.00
10	.14	.00	.14	.00	.22	-.22
Total	--	--	1.64	--	--	1.41

During the summer bluestain was the major cause of degrade. It affected equal volumes of roofed and non-roofed lumber but it was heavier in the non-roofed lumber. Since lumber-grading rules will not permit as much stained area in the higher grades as in the lower, the most severe degrade occurred in the non-roofed pile of Selects and Better.

There was little difference in the moisture content of roofed and non-roofed lumber after 45 days of drying in either season (fig. 2). However, roofed lumber dried at a more uniform rate, and reached the fiber saturation point (approximately 27 percent moisture content) 12 days sooner in the spring season.

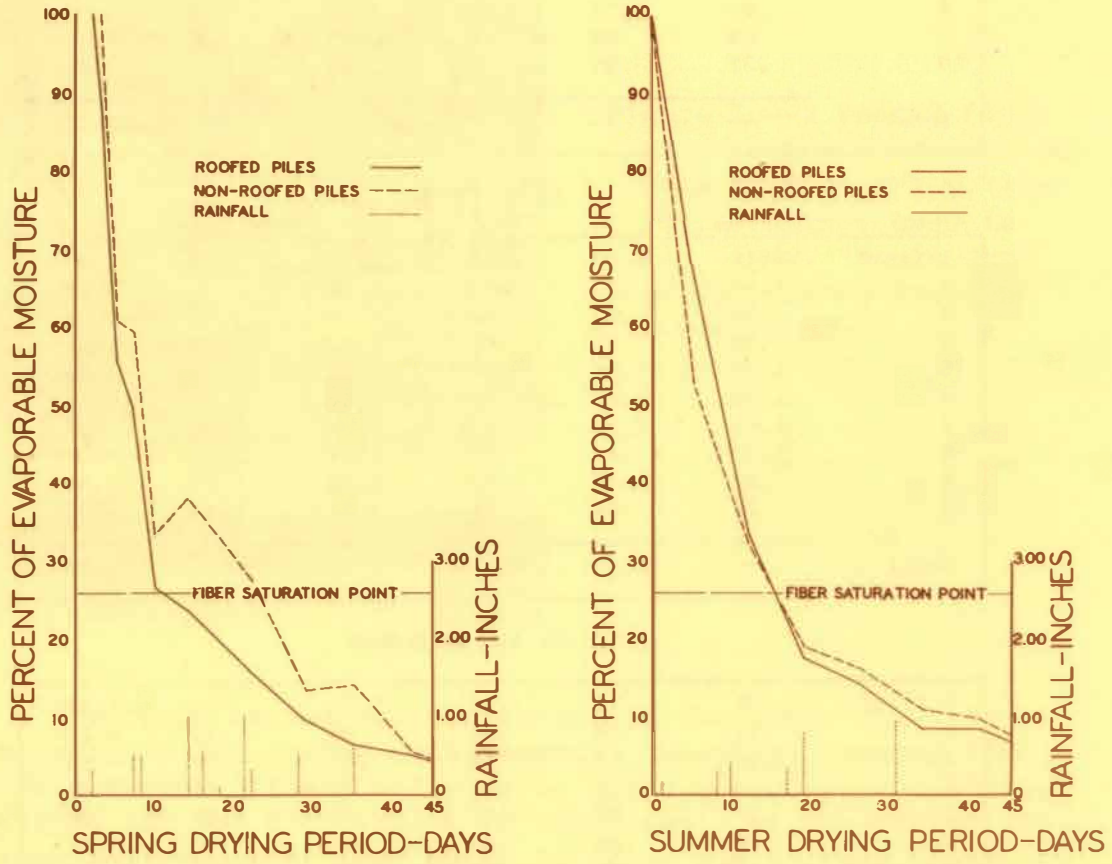

Figure 2.--Lumber in roofed piles dried at a more uniform rate than lumber in non-roofed piles, especially during long periods of rainy spring weather. Evaporable moisture is the amount of moisture that green lumber must lose before its moisture content is in balance with that of outdoor air.

A sturdy, rain-tight roof can be built for about $25.00. Using a forklift, an operator can place and remove a roof for about $1.00. Such a roof can be used at least 20 times if handled with reasonable care.

A $25.00 pile roof will pay for itself in three uses on Selects and Better yellow-poplar lumber, and in seven uses on No. 1 Common. Apparently, however, it does not pay to roof lower grades of lumber (fig. 3). If the same roof is used for 20 air-drying periods of 45 days each, it may be expected to earn a net profit of about $10.00 per use on piles of Selects and Better yellow-poplar lumber, and $2.64 per use on piles of No. 1 Common. These earnings do not include increased values due to the better appearance of lumber dried in roofed piles.

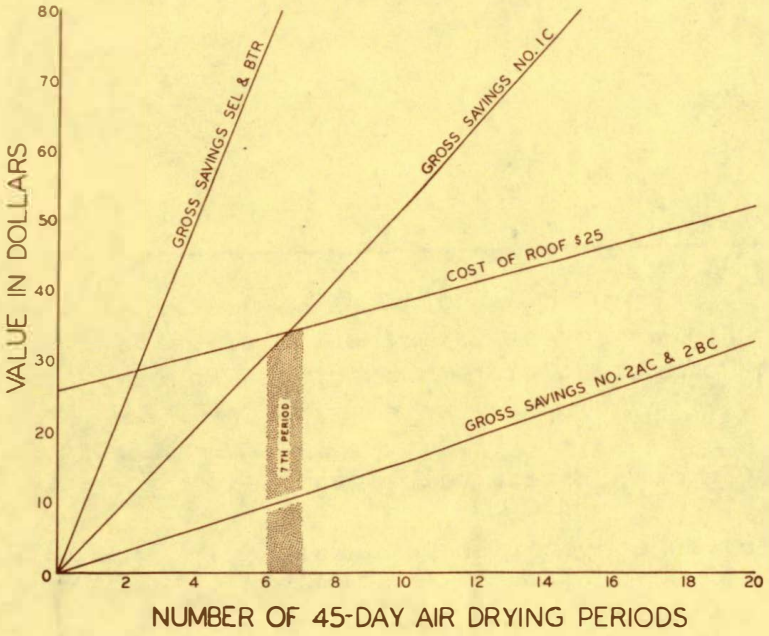

Figure 3.--This chart shows the number of uses required to pay for a $25 pile roof when used for different grades of lumber that are sold at the prices used in this report. It costs $1 to place and remove the roof which is assumed to have a life of 20 uses. The interest rate is 6 percent. Example: When used on No. 1 Common lumber, the roof will pay for itself during the seventh 45-day drying period. After 10 periods, the roof would have cost $38.50 ($25 cost, plus interest on investment, plus handling costs) but would have saved $52 or made a net profit of $13.50 by reducing seasoning degrade.

The Central States Forest Experiment Station is headquartered at Columbus, Ohio and maintains major field offices at:

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